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Introduction

In today's business world, where technology has been developed so much, computers and computer applications play a major role in the operations and information processes. Evolution of this technology created new needs and in a way created new patterns for operating procedures. Due to this technological breakthrough, companies had the opportunity to create information networks that were based on what is known as information technology (IT). A subdivision of this field is IT for team management, or in other words, information systems utilized by teams.

It seems that there should be a difference between IT in general and IT for team management, otherwise, why is there a separate term for this specific application? The answer to this question is not so clear. Actually, IT utilized by project groups is the same with any other application. The difference occurs in the software that is used by the group members. Of course there are many different definitions and a very general definition is the following:

Sharing of information by a group, achieved through the utilization of an electronically interconnected system that includes e-mail, v-mail, video conferencing and shared software programs (i.e. Lotus Notes, Coordinator).

Historical Background

The pioneer ,or else the company that implemented first the concept of IT for team management was Hewlett-Packard (Dr. George Scott). Due to the fact that everyday business operations and projects had to be done by teams, that their members need to communicate on a regular basis, HP created the real world application. Of course this happened eventually and not in one day and this event is located somewhere in the mid 1980s. Today, the companies that using this concept widely are IBM, DEC and Travelers and they are considered to be the pioneers

in the practice field (Dr. Ian Webb). Nowadays, applications of IT for team management are more widespread in the individual level rather than the company level. It requires a considerable investment and not many companies are willing to do so.

How does the system works?

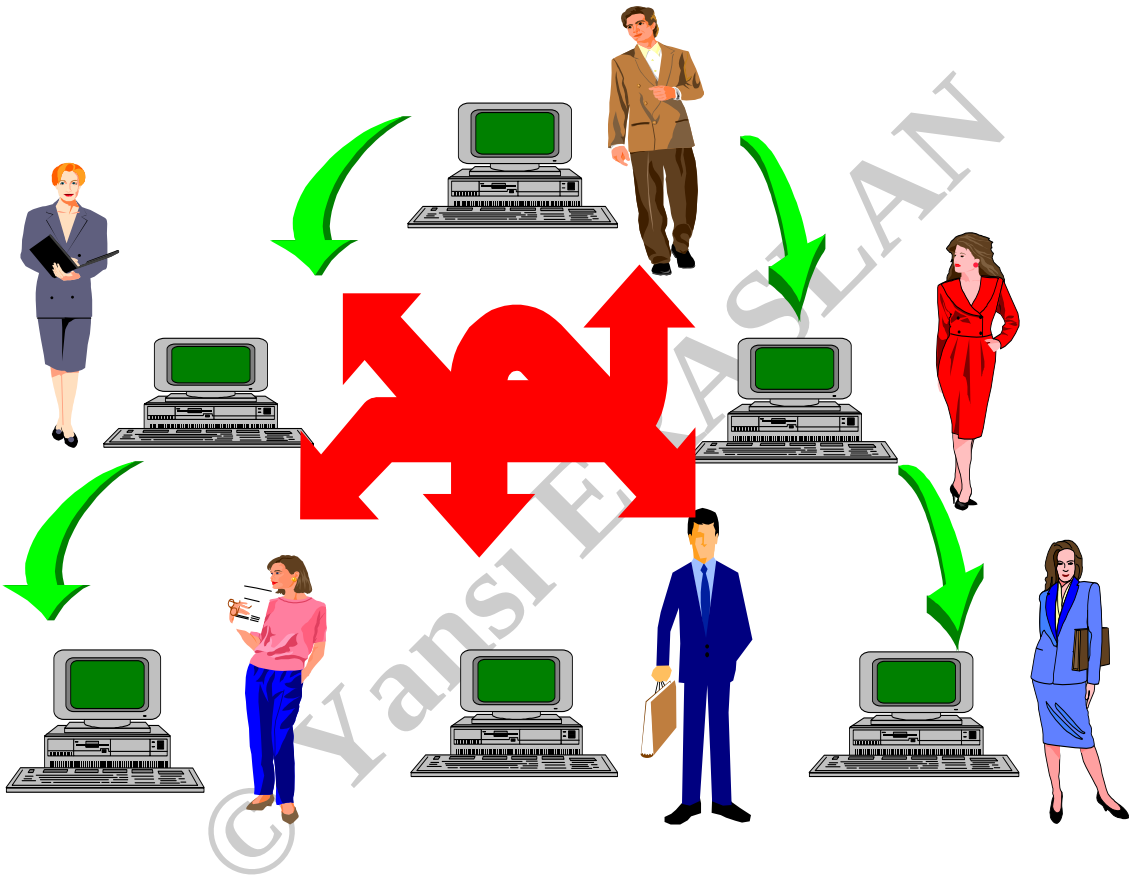
The whole system that is usually utilized by groups for such an application contains the following components (Dr. Ian Webb):

- Home Database
- Work Station
- Modem/Local Network (LAN)
- Hardware
- E-mail, V-mail
- Software/work group computing system
- Maintenance person/ Administrator of the database
- Several PCs

All the members of the group are interconnected electronically and they are sharing several information through software programs. There is a recognized set of procedures, in the sense that every group member knows who gets the data and how. Usually this procedure is setted by the coordinator, or else the group leader. This is a way to enhance discipline within the group, since the coordinator structures the messages that go back and forth and indirectly can "draw the lines" for each group member. It is obvious that this practice changes the way that teams were managed up to this point and requires more discipline and more commitment from the group members.

As it can be seen in the graph below, several people using their PCs can communicate with one another. One of them is the leader/coordinator, and the rest are the group members working on the specific project. These persons can work within the same department, within the

same company but in differnt departments, within the same city, within the same country or even in different countries all over the world. There are no boundaries for information systems and IT.



All these persons can communicate with one another and at the same time they all have access to the same set of information since they are using a common data base. The members can be employees from different levels of the organization and many times the group leader/coordinator is a top management officer. This organized communication offers time saving and convenience. In addition, uniformity can be achieved, fact that helps in the

strenghtening of the team cohesion. Very common examples of implementation of IT and team management, from the real world, are product development projects, engineering projects and investments projects.

Example:

Dr. George Scott, a professor at UCONN, is working on a group project with Dr. Lou Mandel, professor at MIT, Dr. John Yannouzas, professor at University of Paris, and Dr. Gim Seow, professor at People's University of China.

Dr. Scott is the leader/coordinator, and every week he is checking the input of each of the members. The software that is utilized is Lotus Notes, since it provides the two elements that are most important for this case, an e-mail and a project documentation system. Due to the existing difference in time, each group member works different hours than the rest members. Nevertheless, if it happens and two or more persons are working simultaneously at the same document, the system has the ability to incorporate the new information immediatelly. The only problem that may occur is if both persons are revising the same part of the specific document.

Till the completion of the project, Dr. Scott has to get and check the input of all the members, and he is the one responsible for the correction and final setup of the project. Usually the coordinator is the person that gives the guideliness to the members and at the end gathers the final outcome. Of course, the convenience in this example is the fact that four people are working on a project by being in three different continents, without any need to have regular daily or weekly meetings. Time saving, which is of vital importance for today's businesses is one of the major benefits.

How did IT evolve and what did it change in the business practices?

As it was stated before, due to the evolution of technology, the need for electronic interconnection in team projects arose. In a way it was part of the general thought that all possible resources must utilized, so as a company can gain the competitive advantage against its competitors. As Dr. Mulvey said, management practices had to change due to this technology evolution. It is more effective, more efficient and for sure less time consuming and less costly in the long run.

In addition, IT for team management was considered, and still is, to be part of business process reengineering (BPR), a tactic that many companies decided to follow so as to change their way of operations to a more effective one. Of course IT for team management has its advantages and its disadvantages that will be analyzed latter on, but in general it is perceived as a new application that works better in many instances. Since BPR requires a completely new set of procedures, as Dr. Scott mentioned: "...destroy everything and start from scratch", many companies believed in this team management and IT approach. Business process reengineering is just the means that can lead to the ultimate goal that each company sets.

A very critical change that occured due to this electronic interconnection and utilization of information technology is the change in the corporate boundaries. In the past, only top executives had access to important information. They were responsible to scan the information and make available to the employees only the parts that were direclty related with the relevant project. Now, all the involved members have access to this data base and they can get any kind of information they like. Sometimes top executive managers get involved in such projects and at the same time middle managers, and lower level employees are working in these projects too. All these persons have access to the same set of information, which sometimes is much more important and confidential than the corporate level of some of the group members. Therefore it

is evident that the corporate boundaries change rapidly and in some companies they have become much more narrow than they were before.

The issue of the corporate hierarchy can be addressed here, in the sense that the traditional corporate structure/hierarchy is changing, or if you like evolving, to a more flat structure. In a way this is necessary for the companies that want to gain a competitive advantage in their industry. When employees know what is going on within the company and are aware of all the problems, then their performance tends to become better and better. As Dr. Mulvey pointed out, this gives more meaning to the regular employee job; therefore, he/she feels much more responsible to perform better.

Last but not least is the need for global interconnection. Geographical boundaries change also through the use of IT. As it was described before in the example, many people from different geographical regions, even different continents have now the ability to work at the same time on the same project, without the need to be in the same room. Time and money savings are considerable, and this is the reason why companies started practicing it in the last few years. On the other hand, in this respect, IT is used more by individual professionals than by corporations, since not many corporation have achieved global expansion.

Part of the process that was described above can be directly connected with the new business setting that appeared in the last few years and will continue its expansion in the future (Dr. Ian Webb). What is this? People working on the same project being in different geographical regions, having a much higher performance/productivity, being more effective and efficient in their job and finally presenting a superior outcome. In other words, location changes since there is no longer the need to be the same for all group members, while at the same time considerable time savings can be achieved. This is what most companies consider to be the base for the desired competitive advantage.

Team Management Aspect

Advantages and Disadvantages of Using IT in Team Management

In an interview, Massachusetts Institute of Technology's professor Thomas W. Mallone discussed how technology is shaping organizations. The business models that worked in the decades after World War II are becoming obsolete. CEOs are confused and are troubled and do not know what to do to a degree much greater than ever before. It is ironic that these changes may in some ways be caused by information technology at the same time that the solutions and the ways of dealing with them also involve technology. Besides adding new technology, one of the solutions the corporate world seems to be turning to is team-based organizations. Team-based organizations and network organizations are often more quickly to change in the environment or to innovative ideas because it is not necessary to convince everyone up a management chain of authority.

The organization of the future will be a network structure, and information technology should support this structure. The organization of the future will be flatter, contain small units, be networked, include leaderless teams and be viewed with larger boundaries. Changing the organizational structure to reflect reality is a long-term solution that will make the organization operate in the best way. CIOs must recognize teams as an entity- individuals or formal structure is not enough.

What follows is an analysis of the advantages and disadvantages surrounding the use of information technology in Team Management.

I. Advantages

One of the most important advantages, if not the major one, of using IT in Team Management is the free movement of information. Information is made available to everyone inside the organization who needs or wants to be informed. Therefore, all who need to share the same piece of information can do so, because the fact that one is using a certain part of the database does not mean that this part is unavailable to the rest that particular instant. Thus, information among team members and between teams moves freely and fast.

Another advantage is that it disperses decision making inside the organization. After a period of downsizing, globalization, restructuring, and information technology implementation, today's leaders must adapt to a vastly different business environment. Business is already moving to organize itself into virtual corporations; interchangeable modules built around information networks, flexible work forces, outsourcing and webs of strategic partnerships. Virtual leadership is about keeping everyone focused as old structures, including old hierarchies, dissipate. The two fundamental tasks facing leaders are:

a. To develop and articulate exactly what the company is trying to accomplish **and**

b. To create an environment in which employees can figure out what needs to be done and then do it well. These "post-heroic leaders' do not expect to solve all the problems themselves. They realize no one person can deal with the emerging goals of speed, quality, customer satisfaction, innovation, diversity and technology.

Mainly due to the reason that information becomes available to everyone in the organization, the role of the management, as it was once defined, has changed dramatically.

Organizational structure has shifted from the traditional pyramid of authority and influence to the more flexible and "democratic" hierarchy of today, where everyone is free to communicate directly and at the same time with everyone else, including the management.

Information technology is also responsible for reducing friction inside the organization. As effectively as it brings people in the organization together, it can keep them apart if the management chooses that it is necessary for the well-being of the organization. In the case of people who have proven to be unreconcilable and are unable to work together but are very productive when working separately, IT makes it possible for them to have the distance they need.

In addition, IT facilitates communication inside organizations in another way. IT eliminates the air time constraint, "the waiting period", that used to exist because people had to wait for the person on the receiving end to get their message and send his or her own. What exists today is a simultaneous exchange of ideas between people in the same floor of an organization, on different floors of the same organization, among different organizations in the same country or in different countries. Scholars in different countries working on the same project, corporate executives, students and scientists exchanging views on research development have only to devote a brief amount of time in order to communicate and receive data with team members that live thousands of miles away.

Electronic brainstorming has replaced the conventional brainstorming, with all the advantages that accompany it. The difference between the two kinds of brainstorming lies in the fact that electronic brainstorming can take place at different times and in different places or it can involve people exchanging their ideas at the same exact instant. All of these aspects of electronic brainstorming would be impossible in conventional brainstorming, where everyone would have

to sit around a table and argue his or her ideas in the time limit provided by the moderator of the discussion.

Electronic brainstorming also encourages idea generation, because people that are less aggressive are more inclined to provide their ideas, safe behind the anonymity that IT can offer. Employees that were afraid of the management's reaction to their suggestions do not have to keep silent anymore but are able to express their views freely, without any concern of intimidating or offending the management.

As discussed above, because of the free flow of information, management loses its influence power. The change in hierarchy has made lower-level employees more equal to upper-level employees. As a consequence teams have become more effective, because subordinates are not as much fearful of offending their supervisors. Furthermore, supervisors do not have the same amount of power as before to halt the advancement of an effective and productive team member.

IT smoothes communication between the senders and the receivers by the loss of non-verbal messages, such as body language and the tone of voice. Misuse of non-verbal messages can discredit or embarrass the sender and be the cause for misinterpretations and misunderstandings. When IT is used, only the message itself is transmitted, without any body language barriers or fractions due to unpleasant tone of voice.

Finally, from the group management point of view, IT is a structuring device inside an organization. Everyone involved in the IT environment are aware of everyone else's position, functions and responsibilities. This structured environment makes job duties better defined and, therefore, communication becomes less complicated.

II. Disadvantages

The most obvious disadvantage probably is that IT, by its nature keeps people at a distance, even when they want to communicate face to face. People do not get the feeking that they belong to a real team, even though their functions and responsibilities have remained practically the same. They tend to complain about the loss of the human element of communication. Using electronic mail, voice mail, LAN and all the other aspects of IT is exciting and convenient and, in many cases, absolutely necessary. Nevertheless, employees feel deprived of their need to come in personal contact with their teammates.

In addition, IT represents a threat to the managers. This can be a very important problem, because if the management perceives IT as an enemy to its power and influence, it can stop or delay its introduction. Some effort must be conducted so that management realizes that IT is a means of doing the job better, faster, and easier for everybody concerned.

What was previously mentioned as an advantage, the loss of non-verbal messages, can also represent a disadvantage. As much as bad non-verbal messages can get in the way of effectively communicating a message, good and effective use of body language and tone of voice promote and strengthen your message and make it more credible. All this support is lost when using IT.

Finally, friction most times reveals which is the best idea. In conventional discussions and brainstorming, people used to argue their ideas several times, until the best one, usually the one supported the best, was adopted by the largest number of people taking part in the meeting. With this thorough and successive exchange of ideas, several new ideas were produced, frequently of better quality than the original ones. IT, by eliminating friction, runs the danger of eliminating the generation of several new ideas.

Technological Aspect

As the nineties progress and the technological focus turns to networked computing, the fundamental term "computer" is called into question. When it was first developed, the computer was used exclusively for performing calculations and presenting the results. Now, computers are more for coordinating information, such as the tracking of inventory, product orders and accounts than computing. This change of focus can have three significant effects on society. As the technology shifted from computing to coordination, clerking jobs and up to middle management positions were eliminated by machines, flattening the hierarchy of organizations. A second effect is the faster coordination of information, allowing companies to diagnose a defective product and take pre-emptive action or explore other options to satisfy a customer's needs. This advent of technology is also capable of replacing the management positions it eliminated by focusing the personnel on more complicated, complex tasks rather than the simple communication and computation required of them before. The third effect is the tendency toward a more coordination intensive organizational structure (Malone, Pg. 128). Technology will develop to critical support factors by streamlining the transfer and interpretation of information. This helps the company to create a competitive advantage in its market and flatten the hierarchy of the organization to increase market response time.

The new software and hardware created to meet the new demands of business will reduce the barriers of time and space, increasing the speed of transferring information between workers and work groups. These new groupware information technologies are categorized under the catch phrase of "collaborative computing" (Hsu, pg. 113) and will enable people to work together in ways not previously possible. This technology will facilitate cooperation and coordination of information between team members by allowing common information to be stored, shared and communicated though applications developed, or being developed, including electronic mail systems, calendar management and agenda planning, computer conferencing and, ultimately,

video conferencing. These different types of systems can be combined to create comprehensive work group support packages. These systems work to create or support electronic meetings and exchanges of information through the combination of graphics, text, audio and video, otherwise known as multimedia.

In order for a system to be considered "collaborative", it must meet three requirements. The first requirement is that of a common task. This is to what extent members of a work group can work together on the same task. The second prerequisite is a shared environment. This allows one to keep track of how a project is progressing, what one's co-workers are doing and what the atmosphere or setting of the workplace is. The last demand concerns the interaction of time and space. The advantage of collaborative systems focuses on the elimination or, at least, reduction of constraints imposed by time and space. There are four types of interaction: synchronous, asynchronous, distributed synchronous, and distributed asynchronous. Synchronous is face to face meetings, while asynchronous is interaction at different times at the same place. Distributed synchronous occurs at the same time but at different places and distributed asynchronous occurs at both different times and places (Hsu, pg. 114).

Group decision support systems (GDSS) work within the framework of collaborative systems and are designed to support the interaction of electronic meetings. These GDSSes provide tools for decision structuring, idea generation, voting and ranking. GDSSes have three levels of complexity.

The first level is the most basic and emphasizes improvement of communication between the interacting parties, idea generation and discussion, and messaging. Level two incorporates the strengths of decision support modeling and group decision techniques into the system. Such techniques include project planning and operations research tools, probability and decision tree software, and "statistical features and decision techniques designed to solve complex problems

and help coordinate information sharing and exchange in an asynchronous work group" (Hsu pg. 115). The third level is still under development but will automate group communication patterns. Such systems will allow the users to select and arrange meeting rules and will include tools such as an automated counselor and Robert's Rules of Order.

The current hardware is rapidly running out of room to maneuver the vast amounts of information used in these collaborative computing systems. The existing LANs are limited in their data carrying capacity, or bandwidth, typically to one-tenth of the speed necessary to carry the huge sets of data used by collaborative systems. This is the most significant obstacle to the use of real time video conferencing. As an example, the amount of data required to transmit a ten minute broadcast in real time would fill five sets of the *Encyclopedia Britannica* (Clarkson, pg. 123) Another obstacle is the fact that LANs, such as the Ethernet and Token-ring, are shared media networks. Shared media networks use mechanisms that ensure only one user has access to the network at a time (Saunders, pg. 61). This forces other users into holding pattern for transmitting or receiving their data. The shared media architecture can cause interactive, multimedia applications to crash and rules out the continuous stream of data generated by video conferencing.

Steps are being taken to overcome these obstacles to the more efficient transfer of information necessary in collaborative systems. The slower LANs are connected to backbone networks to create WANs. These backbone networks use different types of technology to boost their speed to the level necessary to handle the volume of data generated by the collaborative systems. Such technologies include Copper Distributed Data Interface (CDDI) or FDDI over Copper, Fiber Distributed Data Interface (FDDI), Fast Ethernet, Asynchronous Transfer Mode (ATM), and switching hubs (Saunders, pg. 58).

CDDI uses the existing copper wires to transfer its data from one network to another. This is the cheapest option open to companies since the wiring is already laid. FDDI uses the fiber optic lines and is more expensive than CDDI. FDDI and CDDI are similar to a token ring but 10 times faster. The cost of upgrading to these new technologies is still relatively expensive to companies. Fast Ethernet is another product available that provides the same speed as FDDI but is less expensive and works with existing LAN technology. Fatal flaws to all three of these systems are that none guarantee real time delivery of information, none can be delivered directly to the desktop and all are still shared media.

The technology that is not shared media and will deliver real time data is ATM. It is the most expensive option and is still being refined. The concept is similar to the switching used in long distance telephone calls. Switches are universal connectors which will allow virtually unlimited data carrying capacity. The total bandwidth of an ATM is equal to the maximum bandwidth of the LAN times the number of lines going into the switch, divided by two (Clarkson, pg. 124). For example, if there were 100 10-Mbps lines into a switch, the speed of the network would be 0.5 Gbps (Gigabits per second) or (100 * 10)/2 = 500 Mbps.

Another advantage of ATM is that is a packet switched network. It breaks down the data into smaller packages, sends them to their destination and reassembles them. This allows for the connection of different channels of varying speeds and data types (text, audio and visual). ATM is the most likely choice of future LANs because of the versatility of speed and data transfer it handles, the synchronous delivery of multimedia, including video conferencing, and because ATM can be scaled from the LAN to the WAN. Since ATM has its roots in the telecommunications industry, it is also a global standard, allowing for the possibility of seamless connection between public and private networks.

Until the ATM technology is perfected, there is an alternative to companies restructuring their existing systems entirely and still obtain a faster Ethernet. The upgrade requires changing the old hub with a new switching hub and it can be done without changing any of the other software or hardware. This allows you to multiply the number of users by the maximum speed of the existing LAN. 100 people sharing a 10-Mbps LAN would have an aggregate speed of 1 Gbps. As it stands, switching hubs do not have the packet switching ability of the ATM. However, there are modifications that can be made to allow for packet switching. The system can also be modified for "full duplex" (Saunders, pg. 65). This doubles the bandwidth of a line and allows for incoming and outgoing data to be transferred at the same time. This is a popular option because it can be easily teamed with network management software, imitating the ATM's ability build up and take down virtual work groups without altering the physical network. The power of this upgrade and cost savings are so significant that switching hubs may supplant desktop FDDI. However, as a shared media architecture, the switching hub will not allow for the continuous stream of data used in video conferencing.

What is the importance of this technology and why are companies racing to perfect faster and faster network speeds? The goal and future of business communication and collaborative computing is video conferencing. The ability to provide video, audio and text in a distributed synchronous meeting will be crucial to gaining a competitive edge in the marketplace of the future. ATM technology will run into the desktop of the individuals of a work group spread through a company, the country and the world. They can confer, coordinate and exchange information with others, reducing the cycle times of idea generation, product development and product upgrades without leaving their desk, be it in the office or in the home. This will speed decision making and save on transportation costs providing the company with a competitive advantage in its market. Until the technology is perfected though, it is imperative that the company recognize the steps needed to be taken to reach this goal and for the producing to recognize that this technology will be best utilized if each stage of improvement is compatible

with the previous stage. This will allow for organizations to upgrade their systems incrementally, instead of dumping all the hardware and software at once and installing a new system at great expense.

Touch-Tone Telephone Registration

Introduction

A few days ago the University of Connecticut initiated a project. This project involves the use of information technology in facilitating the registration procedure. More specifically, an information system is utilized in order to help students register through a touch-tone telephone. Right now, the system is used on a trail basis, but in the near future chances are that it will be successfully adopted by the University as a whole.

Team management aspect

Touch-tone Telephone Registration can be examined in two ways. The first, and most apparent, is the way students perceive it. From this perspective students only care about how the system is going to facilitate registration procedures, which is at the same time the system's main goal. However, there is another way of looking at this project. That is, from the point of view of the University Departments associated with the registration procedure. In this manner, the Touch-tone Telephone Registration project can be both connected to team management and perceived as a major team management facilitator in the University. In fact, there are many different ways to look at team management at the University and many different teams to examine. The system can facilitate the teamwork conducted within the Graduate Center itself, between the Graduate Center and the Registrar's office, or between the Graduate Center and other

Graduate Schools of the University, like the Business School. The particular ways that the system can be of any assistance to these functions will be addressed later in the analysis.

Technological Perspective

Primary Ingredients of the System

1. Telephone circuit

   It is evident that in the future the telephone, by itself or incorporated in a computer, will constitute a very useful tool as far as information technologies are concerned. So, eventually, the telephone will be used as a miniature computer keyboard.

2. Computer software (CICS)

   CICS stands for Computer Information Control System, and it is a newly purchased software from IBM, after consecutive competitive bids and after meeting all the Government requirements (RFQ, RFP). In the words of Mr. Richard J. Stec, Director of Administrative Services at the University of Connecticut, the system as a concept exists for a number of years. Still, this particular application is not very widely used. In fact, it was initiated in Brigham Young University of Utah.

3. Interface between the telephone circuit and the computer

   The telephone appliance will interface with the computer software which is going to do the registration. The already existing THESIS system is going to be used in a parallel fashion, at least during the first stages of the system implementation.

Procedure

The registration procedure is very straight forward. What a student needs to know is his or her social security number and personal identification number. The Graduate Center is going to set a timetable for accessing the system. That means that, based upon semester standing, each student will be assigned specific access call-in times. There will be a script in the form of a long series of spoken commands, that will help the student through the registration procedure. Finally, there will be registration bars that will need to be removed before one can access the system. These might be related to financial obligations one might have, to health requirements, or to advisory procedures. So, the advisor will be responsible for removing a bar, and the same goes for the Graduate Center, the Health Services and the Bursar's Office.

Technical Prism of CICS

As mentioned above, CICS stands for Customer Information Control System. Its functional use consists in controlling the access to the outline files on the mainframe for purposes of on-line transaction processing. In addition, CICS permits many users to use a file at the same time. It can handle several requests to one function and it keeps track of each of these requests by updating, prioritizing, controlling and ensuring the consistency and security of the process. How this is done? CICS is called from a COBOL program, from which a map, or else a screen of information, is transferred. CICS controls the map and every transaction to and from the files, and sends information to a voice responder, which in turn transfers them as they are coming in, to verbal messages. The information given by the user is transferred back through CICS to the mainframe application. Then system accepts the PIN of the user and sends a transaction screen, which has additional data, such as the name and semester standing of the user. This procedure goes on until the registration is complete. CICS has other applications as well, like the control of

accounts receivable or financial aid. It is based on a UNIX system but it can work in a network environment as well. For more information refer to Exhibit A.

University Perspective

Reasons for Initiating the Process

One of the most important aspects of this project can be traced in the Graduate School's perspective. So, in order to develop a substantiated view of the system, one has to identify the particular reasons which provided the incentive to the people of the Graduate School to initiate it. In the words of the Associate Dean of the Graduate School, Mr. Edgar E. Sellers, the reasons that contributed to the initiation of the project range from the existing technology and the willingness for improvement, to the trend toward decentralization that prevails in the Graduate School lately. Mr. Sellers, who is also the Director of Graduate and Research Information Systems, is mainly responsible for this project.

One of the principles that govern the successful implementation of information technologies' applications is the one that requires from the organization to be information incentive in order to be quick in its responses to environmental threats. This is the case here in the form of an already existing system called THESIS (The Student Information System). This program existed before the new system was implemented and it is still in use, since it is thought to be helpful whatsoever.

The second reason has to do with the problems associated with previous registration attempts. These were dominated by some rules of bureaucratic nature which resulted in confusion, frustration and misunderstandings of various kinds.

The third reason is related to the trend that exists at the moment in the Graduate School at the Dean's level, toward decentralization. So, the whole idea was tailored to the top management's inclination toward decentralization and delegation of authority to all the functional levels of the hierarchy.

CSF Approach

Still, one of the best uses of information technology is the one that makes it valuable to the management of the organization's critical success factors (CSFs). So, the question that rises is: What are the University's CSFs that are directly or indirectly affected by the Touch-tone Telephone Registration System?

Student recruiting is considered to be the most important CSF of every University. The new system will eventually help the University of Connecticut to adopt an open matriculation policy. In that sense, accurate financial planning can be achieved that will lead to cost control, which constitutes an other important CSF. However, there are problems associated with an open matriculation policy, especially in the Business School. Some of them will be addressed later in the analysis. Finally, the quality of the advisory process will be affected, hopefully to the better, since advisors will not have to get involved with the meaningless routine requirements of the job any more. As a result, they will have more time to allocate to quality advising.

BPR Approach

Another relevant question to the implementation of the new system is the following: Is this a business process reenginering (BPR) case? The answer is a little more complicated that a simple yes or no. We can trace tow factors that advocate for a positive answer. First, a redesign of business processes is evident and second, there is gradual improvement due to IT support.

Still, in this case we have a parallel use of standard operating procedures (SOP), in the form of THESIS. Thus, we cannot speak of a zero based redesign of business processes, since not all of the definition requirements are met.

Benefits

The system is expected to benefit the University in many different ways. Some of these are explained below.

- Dispersion of decision making

The system will enhance the general trend toward delegation of authority which will include dispersion of decision making.

- Facilitation of information flow

The information flow will be facilitated. So, if the director of the MBA program wants to know how many students registered for a particular course, he or she can do that very easily through a computer screen. If, for instance, there are section overloading problems, a quick solution can be given. However, there is no complete transparency with regard to the courses a student can take since he or she will be able to change the personal identification number (PIN) at will. In this particular point the Director of the MBA program has some serious objections.

- Simplification of the process

This includes both, the reduction to some extend of the bureaucracy involved, as well as the elimination of student lines. In that sense, the contact between the students and the administrative units is minimized. In addition, the Graduate Center comes a step closer to the student, thus reducing the gap between them.

- Reduction of conflict

As far as team management is concerned, this system reduces the involvement of a participant at the personal level. This can be a disadvantage, since the personal element is usually crucial to team management. Still, it can be an advantage if there such a situation that involves irreconcilable conflict. So, when two people, say one from the Business School and the other from the Graduate School, cannot get along together, they can be kept apart and still function.

Concerns

There are several concerns associated with the new system. Some of these can be perceived from two different angles. In that sense, they can be positive or negative always depending on the way one evaluates them.

- Technology phobia

There are always some people who feel that the new technology will cause several problems. Some of the secretaries in the Graduate School expressed this concern. Their concern are, if anything, unsubstantiated.

- System overload

If the system is not equipped with enough lines, it can shut down the entire system of a city. The people in the Graduate School are confident that this will not happen since they have all the necessary equipment.

- Drawbacks of open matriculation policy

There are certain drawbacks associated with open matriculation policy. For example, in the School of Business the resources, in terms of courses available, are limited resulting in less flexibility. Imagine if everyone decides to take the same course.

- Erosion of the advisory process

Some erosion of the advisory process is in order in this case, in the sense that the system tends to replace successfully some jobs previously done by advisors. On the other hand, in the words of Mr. Bob Packard, Director of the MBA program in Storrs, the new system might improve the quality of the job, since the advisor will have more time to devote to career orientation and other important subjects.

- Increased student responsibility

This could be proven to be positive in the graduate level and when we are dealing with mature students who are able to take responsibility. Still, it can be proven otherwise in certain obvious cases.

- Decreased data reliability

Concerns were expressed by the Associate Dean, Mr. Sellers that some people might not fill the appropriate cards correctly or make mistakes in using the system. This will result in data reliability problems, which do not exist right now. In fact the existing information base is fully reliable. The Graduate School is going to set some punishment charges if such problems occur.

- Difficulty in handling priorities

In the School of Business, for instance, there are certain priorities. That is, second year students have priority over first year students, and specialization or concentration students have priority in the concentration courses over other students. Finally, some

integration must be achieved between students from different undergraduate backgrounds or between international and American students. The system cannot do some distinctions, at least at this point.

- Difficulty in adjusting to different set of rules

There are different rules governing the Business School and the other Graduate Schools. For instance, in some Graduate Schools one can register for two undergraduate courses instead of a graduate one, whereas this is not the case in the Business School. Again at this point the system cannot make the distinction.

Conceptual Overview

The bottom line is that conceptually it is a very promising initiative. In fact, the first steps are already made and the system has proven to be successful so far. Further, all the ingredients that are involved in the successful implementation of a new information system are present. The Graduate Center is information intensive already and the whole idea was initiated by the people that lie in the higher levels of the hierarchy.

On the other hand, it still needs some adaptations to the everyday problems that are associated with different policies adopted by other Schools in the University. The MBA Director, Mr. Bob Packard is comfortable with the idea, but not yet convinced by its practical application and overall potential. Undoubtedly, the system needs to evolve to a certain extend and to become more sophisticated in order to deal with the problems mentioned above. Two particular areas that will play a major role in this evolution will be the level of technological development in the University and the ability of the faculty members to use this technology.

Whatever the first impression might be, it is evident that we are heading toward a new era of information technology in higher education. Thus, the future is associated with various applications of information technology in this field. Those who are able and willing to pioneer in this process will be the ones who will eventually prevail and preserve a competitive edge in this so highly competitive and demanding world of higher education.

Future

Actually, the technologies which will be given in this section are already being used by most of the corporations; however, day by day, they are developed and implemented. In terms of Team Management, three main technologies will have effects on firms in the future: These are Groupware, Electronic Meetings, and On-Line Technology.

I. Groupware

Groupware is the transition from the personal to the interpersonal computer. In other words, the user is a collaborative work group rather than an individual. It is the most common term now used in business communities to describe the general area of computer-augmented teamwork.

The following table shows Future Groupware Developments which will probably be effective as of mid-1990s (Robert Johansen).

Table 1:

	Same Time	Different Times
Same Place	• Low-tech computer aids for conference rooms commonplace. • High-tech, high-touch computer assisted tools financially practical and used. • Portable and desktop tools for team support grow rapidly.	• Team rooms are commonplace, with electronic aids. • Shift work groupware (e.g., international traders, factories) commonplace. • Shared work environments and telework centers grow, though gradually.
Different Places	• Greatly increased use of conference calls. • Conference calls with PC graphics and image commonplace. • Video conferencing continues gradual growth, with some use of computer aids, with an emphasis on portable units and -eventually- desktop video.	• E-mail and V-mail include strong group features. • "Total quality" and workflow support groupware commonplace. • Text filtering and "information refineries" commonplace in a few sectors.

An example where groupware is used is "total quality" methods which are increasing in US. companies. Over the next years, groupware will shift from inside, small teams to the complicated connections across teams. Especially, many teams will cross national boundaries. Furthermore, alliances and customer or supplier links will mean intercompany, as well as international collaborations.

II. Electronic Meeting

Electronic Meeting is the use of audio, video, and computer technologies to facilitate information exchange, negotiation, problem solving and decision making within groups whose members may be separated by both space and time. Electronic Meeting is a part of Group Support Systems (GSS).

To understand the basic idea of Electronic Meeting, let us take a look at the figure below (Bostrom & Anson) :

A color monitor and a keyboard are in front of each person. All computers are linked to each other for exchanging and aggregating information. Software provides support for generating, organizing, and evaluating ideas and judgments. A technical facilitator runs the software and provides the brief instructions needed to operate the system. A second facilitator, who assists the group leader, helps the group work systematically through each step of the budget process. That is an "Electronic Meeting".

However, this setting does not necessarily mean that Electronic Meeting can only be limited in a room. The members can be spread out to other countries and they can attend the meeting while they are in different locations. In the future, it will be possible for a group of Americans to meet electronically with a group in Japan or for a group of Canadians to arrange an Electronic Meeting with people in Australia.

At that stage, an application of Electronic Meeting can be very useful for us to realize the process (Bostrom & Anson) :

Table 2: Goal/Outcome Directed Meeting

Resources (People and Technology)

Present State (Problems)	Action Steps (Agenda)	Desired State (Outcomes)
Topic (step 1)	• Generate	• TASK
Activity	• Organize	• RELATIONAL
Topic (step 2)	• Evaluate	
Activity	• Communicate	
Topic (step 3)		

Here, the purpose is to transform a group's present problem into its desired future through a series of action steps by means of a set of resources like people and technology. Action steps are the set of general activities. For example, a group (a team) generates information, organizes this information into alternatives, evaluates and selects the best alternatives, and communicates with the others.

Benefits of Electronic Meetings

GSS Features	Potential Benefits
Simultaneity	• Opportunity for broader, equal and more active participation • More input in less time
Anonymity	• Less individual inhibitions • Focus on idea rather than contributor • Enhanced group ownership of ideas

Process Structuring	• Provides framework and process structures
	• Improved topic focus
Electronic Recording	• Immediate display of data
and Display	• Easier modification
Extended Information	• Automates complex tasks
Processing Capacity	• Creates easy accessibility to information and others' ideas

Potential Obstacles for Electronic Meetings

- Artificial groups and tasks (Research Design Problems)
- Small group sizes (" " ")
- Poor fit between task and technology (" " ")
- The use of different GSS products
- The absence of a facilitator role

The GSS are intended to improve the effectiveness and efficiency of meetings. They are designed to increase the positive aspects of working in a group (like incorporating multiple viewpoints and sources of information, establishing group consensus and cohesiveness, etc.) and reduce the negative aspects of group meetings (i.e., topic wandering, domination by some members, inhibitions about contributing openly, inefficiencies because only one person can speak at a time, etc.).

There are two key factors that influence the effectiveness of a GSS. First, the GSS used in a meeting should provide the flexibility to adapt to specific group needs regardless of which approach is chosen to perform a task. Second, technical and process facilitation plays a central role in the productive use of a GSS. The facilitator must effectively match the technology to the group and its task and then help the group use the system appropriately to accomplish its task.

III. On-Line Processing

On-Line Processing requires instantaneous response to requests that occur at unpredictable times and rates.

In the 1990s, enterprises will move toward more on-line data processing to support decision making and operations. The hardware and software components of their computer systems, referred to collectively as the "technology", will continue to advance and be shaped in ways consistent with demands of the on-line enterprise.

Multiple Dimensions (Domains) of On-Line Technology in the Future
(Derek Leebaert)

Figure 2:

	Technology	Operating Systems	Applications	Users
	---	---	---	---
Future	Improvements in all areas	Cooperative	Application Generators	Speech and Writing Interface
Today	Availability Reliability Costs Storage	OS/2 Unix DOS	CASE Commercial C High Level Languages	Graphical ICONs

These four domains show independent trends. Computer technology presses for higher performance, greater reliability, and lower cost. Operating systems try to create standards and cooperative interactions between multiple systems. Applications pursue ease of development and portability while user interfaces try to improve users' ability to interact with the systems in an efficient, easy-to-use, and memorable manner.

In response to growing competition and the need to improve productivity, almost all of the organizations will use On-Line technology to become faster and more effective at what they do. By the year 2001, On-Line Technology will likely be as pervasive as the telephone is today. Actually, those organizations that fail to become on-line enterprises will not be in business by that time.

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